

What is claimed is:

1. A projectile launch assembly comprising:

a launch tube having distal and proximal ends and an inwardly extending dimple structure therebetween, the proximal end being adapted to receive a muzzle of a firearm;

a receiver disposed on the distal end of the launch tube, said receiver having connector structure at a distal end thereof for connection to a projectile;

an energy absorbing plug disposed in said launch tube and having a proximal end portion adjacent the dimple; and

an energy transfer piston disposed in said launch tube and adjacent said plug and having a proximal end configured complementarily to said plug and having a distal end configured complementarily to a proximal end of said receiver;

wherein a bullet fired from the firearm muzzle is absorbed by said plug which is thereby moved with said piston distally in said tube; and

wherein said piston engages said receiver to propel the  
assembly and the projectile from the firearm muzzle.

2. The assembly in accordance with claim 1 wherein the proximal end of said receiver is provided with a recess therein and the distal end of said piston is configured complementarily to the recess.

3. The assembly in accordance with claim 2 wherein the receiver proximal end recess is of a frusto-conical configuration.

4. The assembly in accordance with claim 1 wherein said launch tube is a cylindrically shaped elongated tube.

5. The assembly in accordance with claim 4 wherein the dimple structure extends radially inwardly from a wall of said launch tube, to form an annularly-shaped dimple structure arrangement.

6. The assembly in accordance with claim 1 and further comprising a collar mounted on the distal end of the launch tube, said collar being connectable to said receiver to thereby fix said receiver on said launch tube.

7. The assembly in accordance with claim 6 wherein said receiver is releasably fixed to said collar.

8. The assembly in accordance with claim 7 wherein said receiver is threadably fixed to said collar.

9. The assembly in accordance with claim 3 wherein the plug body portion comprises a frusto-conically shaped body portion extending toward said receiver from the plug proximal end portion.

10. The assembly in accordance with claim 9 wherein a distal end of the plug body portion is provided with an enlarged end portion extending outwardly beyond a small end of the frusto-conically shaped plug body portion, and said piston is provided with a cavity in which the plug enlarged end portion is disposed, such that the plug enlarged end portion and the piston cavity effect interconnection of said plug and said piston.

11. The assembly in accordance with claim 8 wherein said receiver is threadably removable from said collar to open the distal end of said launch tube, said piston and said plug are removable from the launch tube open distal end, and said piston is removable from said plug.

12. The assembly in accordance with claim 10 wherein said plug is of at least one material selected from a group of materials consisting of a polymer, lead, aluminum, copper, brass, and

composites and alloys thereof, and said piston is of steel, and said plug is removable from said piston and replaceable by a second plug of the same configuration.

13. The assembly in accordance with claim 1 wherein said receiver connector structure comprises a threaded axial recess in the distal end of said receiver.

14. The assembly in accordance with claim 13 wherein said threaded axial recess is adapted to receive a threaded shaft of a grappling hook.

15. The assembly in accordance with claim 1 wherein the proximal end of said launch tube is adapted to receive a muzzle comprising a barrel and a flash suppresser.

16. The assembly in accordance with claim 1 and further comprising stabilization fins fixed to said launch tube and extending outwardly therefrom.

17. The assembly in accordance with claim 2 wherein the receiver proximal end recess is of a curved configuration.

18. The assembly in accordance with claim 8 and further comprising a sealing ring disposed between opposed edges of said collar and said receiver.

19. The assembly in accordance with claim 18 and further comprising at least one sealing ring mounted in an annular groove in said piston and engaged with an inside surface of said launch tube.

20. The assembly in accordance with claim 1 wherein said energy absorbing plug is fixed to said energy transfer piston by releasable screws.

21. The assembly in accordance with claim 1 and further comprising a bulkhead fixed in said launch tube proximate the dimple structure, said launch tube being provided with a central aperture adjacent the proximal end of said plug.

22. The assembly in accordance with claim 21 and further comprising a washer fixed to said plug and moveable therewith to create an expanding chamber between said washer and said bulkhead upon operation of the assembly.

23. A method for launching a projectile, the method comprising the steps of:

providing a projectile launch assembly comprising:

a launch tube having distal and proximal ends and an  
inwardly extending dimple therebetween;

a receiver disposed on the distal end of the launch  
tube, the receiver having connector structure at a  
distal end thereof for connection to a projectile;

an energy absorbing plug having a proximal end portion  
adjacent the dimple and a body portion extending  
distally; and

an energy transfer piston adjacent the plug and having  
a proximal end configured complementarily to the  
plug and having a distal end configured  
complementarily to a proximal end of the receiver;

manipulating the receiver connector structure to connect a  
selected projectile to the receiver;

sliding the launch tube onto a muzzle portion of a firearm  
until a distal end of the muzzle portion engages the  
dimple; and

firing the firearm;

wherein a bullet leaving the firearm muzzle is absorbed by  
the plug which is thereby moved with the piston  
distally in the tube; and

wherein the piston engages the receiver to propel the launch  
assembly and the projectile from the firearm muzzle.

24. The method in accordance with claim 23 wherein the receiver  
connector structure comprises a threaded axial recess in the  
distal end of the receiver; and

the step of connecting the projectile to the receiver  
comprises threadedly engaging a threaded shaft of the  
selected projectile with the threaded axial recess of  
the receiver.

25. The method in accordance with claim 24 wherein the selected  
projectile comprises a grappling hook having the threaded shaft.

26. The method in accordance with claim 23 wherein the step of  
sliding the launch tube onto a muzzle portion of a firearm

comprises sliding the launch tube onto a barrel and flash  
supressor of a rifle until the dimple engages the flash supressor.

27. The method in accordance with claim 23 wherein the launch  
assembly further comprises a collar mounted on the distal end of  
the launch tube, and the method for launching a projectile further  
comprises the step of connecting the collar to the receiver  
whereby to fix the receiver on the launch tube.